# THE EFFECT OF GROUP INTERACTION UPON TIME JUDGMENTS

By

MORTON A. BERTIN

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# CHAPTER I

## INTRODUCTION AND STATEMENT OF PROBLEM

The advance of science, with few exceptions, relates directly to man's quest for knowledge about himself, his world, and the interaction of each with the other. Perhaps his most primitive awareness concerns a recognition of himself within a medium of moving forces. The satisfaction of basic needs denies an existence in vacuo; with progressive development comes a growing cognizance of his role, reacting dynamically according to the demands of others. With additional experience deeper insights are attained and with them, the understanding that indirect influences contribute actively to the maelstrom of life.

It is significant that social organization, if we define such as falling within rigidly established limits, is less advanced for man than it is among many of the lesser forms of life. Nonetheless, we learn from the anthropologist that no culture has ever existed without some form of group structure, be it as simple as that of man and his mate. Through the medium of art, literature, and philosophy, we depict impressions in terms of fantasy, some form of eidetic reality, or through speculative intellection. Science tolerates and may admire these creations, but refuses to acknowledge their contributions beyond particular and specified boundaries.

By its very nature science must remain rigid and precise;

may speculate only for the purpose of attack; may generalize only when wholly justified; may accept only within the limits of probability. Psychology, in particular, springing from a heritage of philosophy and physiology, and incorporating within its confines a heterogeneity of disciplines, is obliged to proceed with caution. More specifically, we may select the area of Social Psychology, not only because it encompasses the scope of this paper, but also because it came into being in an aura of apology, attempting to justify its existence, pleading for a place within the fold. Even today the social psychologist feels constrained to offer arguments defending his rights as a full-fledged member of the psychological family.

The solution to the dilemma appears obvious: the social psychologist dealing with intangibles need merely accept for himself the same scientific restrictions which govern others. In this way he can devise new and ingenious approaches offering valid, objective analyses in areas heretofore probed through the media of conjecture, assumption, and subjective appraisal.

The multiform aspects of man's relationships with his fellows and the effects of their mutual interaction present an infinite challenge to the student of human behavior. Field studies are difficult to evaluate precisely and objectively; laboratory experiments generally fail to capture the true and vital characteristics being studied. Colonies lower in the phylogenetic scale may be manipulated in ways prohibitive with those at the upper end. Thus it becomes imperative to seek out devices as tools for measuring, indirectly, that which cannot be dealt with in a more forthright manner.

The specific problem under consideration concerns an analysis of the effects of group interaction upon individual judgments. More particularly, it utilizes time judgments, rather than simple sensory modalities, in order to study the possible existence of significant differences in the degree of influence of members within different age groups, as well as within groups of normals, deaf, and blind. One aim of this research will be to maintain rigid controls, to gather and present the data objectively, and generally to adhere to scientific rules of investigation and procedure.

# CHAPTER II

## HISTORICAL BACKGROUND

It is notable that the early philosophers and thinkers were but little concerned with the factors underlying human interaction. True, Plato developed a theoretical social structure which anticipated these interrelationships, but this emerged, fundamentally, as an ethical rather than as a social dictate. For the most part, it appears that such matters were regarded casually, and men expended their energies in pursuit of less ephemeral problems.

Today there is a tendency to look upon the entire subject as a recent addition to the field of psychology. Whereas there is little doubt that the seeds of our present concern lie rooted in sociology, the assumption that psychology's interest in social forces arose recently is nevertheless unwarranted. Wundt, the founder of psychology as an independent science, was intensely interested in man and how he was affected by society. Indeed, he asserted that only through this avenue could one truly study the higher mental processes. Wundt's entire system has been called voluntarism, for he regarded volition as the highest level of apperception, believing further that the only way to understand the workings of volition was through cultural studies.

One of the earliest experimental investigations in this area was undertaken by Triplett (1897)[1] who sought to measure the influence of another person upon professional bicycle riders. Races were held under three conditions: (1) the man rode the bicycle against time, that is, he tried to see how fast he could go; (2) he rode against a team of pacers who merely rode along with the racer; and (3) he rode in a competitive race. Triplett found that the paced speed was best, the competitive race was next, and the race against time alone was the slowest. Next he used 40 school children and had them turn a wheel as rapidly as possible, first alone, and later with another child. Two results were noted: pupils worked more rapidly with another child, but the smoothness of the performance was inferior and there were more uncoordinated movements. Triplett concluded that the bodily presence of another person participating in the task acted to liberate latent energy which would not otherwise be available and hence increased the speed of performance.

The earliest and perhaps most influential textbook on social psychology was written by McDougall (1908). In it he undertook to describe social interaction, and in fact all human action, as resulting from a basic hereditary accumulation of instincts which each individual modifies in accordance with his own particular pattern of experience. Pertinent to the present study was his preoccupation with instincts, not only in the individual, but as forces which interacted among individuals.

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[1] Dates or names and dates in parentheses refer to references in the bibliography.

Although McDougall introduced a system, and brought it to the attention of American scholars, Le Bon (1897), in France, had probed for years into what he described as "the group mind." In describing the fundamental characteristics of the group, Le Bon asserted that its most striking peculiarity lay within the transformation imposed upon the individual members, regardless of what might have been their make-up or disposition. He says, "the fact that they have been transformed into a group puts them in possession of a sort of collective mind which makes them feel, think, and act in a manner quite different from that in which each individual of them would feel, think, and act were he in a state of isolation." He continued by drawing an analogy between the psychological group and its elements as compared to a living body and the cells of which it is constituted. Thus, the union of all results in an organism which has characteristics separate and apart from those possessed by the individual parts. Further, new factors emerge as a result of the fusion of the various components. Le Bon finds at least partial acceptance from the psychoanalytic school by asserting that it is the unconscious which plays the dominant role in the dynamisms of interaction.

In this regard it is of interest to note what Freud (1922) had to contribute. He is little concerned with the chemical-like emanation described above; to him the important aspect of the relationship lies in the freedom accorded the unconscious, allowing it to cast off the repression of instincts striving for recognition. Turning to the group itself, he likewise attributes its actions to the activity of the unconscious, asserting, "A group is extraordinarily credulous and open to influence, it has no critical faculty, and the improbable does not exist for it. It thinks in images, which call one another up by association (just as they arise with individuals in states of free imagination), and whose agreement with reality is never checked by any reasonable function. The feelings of a group are always very simple and very exaggerated. So that a group knows neither doubt nor uncertainty."

Burnham (1910), addressing his remarks to the members of The American Association for the Advancement of Science, sought to present a brief historical summary of studies conducted to evaluate the influence of the group upon the individual. He prefaced his discussion by asserting that an individual alone and the same individual in a group are different psychological beings. As an example, an experiment was cited which had been conducted in Wurzburg by Mayer in 1904. The problem was to test the ability of pupils under two conditions: alone and with others. Dictation, mental arithmetic, memory tests, combination tests, and written arithmetic were used. In general the findings supported the notion that work done in the presence of others was superior to work done alone, both in quality and time required. Mayer postulated that there was some type of mental rapport or class spirit which enhanced the output.

In the same year, Meumann corroborated the results found by Triplett (described above) by using a dynamometer and an ergograph. There was always a decrement of work in the alone situation.

In this same vein, Fere had found that the amount of work that one could do with the ergograph was increased merely by having another person go through the activity of contracting the muscles of the fingers in sight of subject and experimenter, the second person acting the role of pacemaker for the first.

Burnham states,

> There is undoubtedly an effective stimulus in the presence of the group. This is the stimulus which comes from our social impulses as inherited from the past, . . . a certain degree of affective stimulus undoubtedly increases the ability to work, but if the stimulus is extreme the work is checked or inhibited altogether.

Stage fright is cited as an example of this, and further,

> In a true social group the relations are vital. Each individual feels a responsibility and performs some service for the group. Here the stimulus is likely to be greater. Perhaps the greatest stimulus to mental activity from the group is social success to those who can achieve it. . . . Among the pathetic tragedies of childhood are the cases of those who never can achieve success because of defect--the child with defective vision who cannot see the blackboard, the deaf child, . . . . An important relation between the development and integrity of the sense organs and mental efficiency has been shown by a number of investigations.

In a somewhat different mood, Peterson (1918) takes psychology to task for failing, adequately, to analyze and explain the various responses of man to his human environment. This he considers to be a responsibility which it owes to the other social sciences. To Peterson, ideas are essentially ways in which a large number of persons respond in the same manner to certain symbols or objects. Thus, the stability of concepts and the stability of customs are the same.

With Floyd Allport we reach a milepost; just as Bain bridged the gap between the psychology of the nineteenth and twentieth centuries, so Allport may be regarded as one of the important links between social psychology of the past and the present. In one of his early writings (1920a), he reviewed three dominant topics of interest in the area: (1) social mind theories, (2) social behavior of the individual, (3) social behavior in relation to society. He ridicules the first and emphasizes the importance of the second and third asserting that "social life is . . . complicated by the fact that each man serves as a complex stimulus to his fellows." Social behavior may be regarded as dichotomous: a response to direct social stimulation (face to face), and a response to indirect social stimulation (performing any action in the presence of others or in common with them).

He mentions an experiment performed by Moede in 1914 dealing with social influences under conditions of rivalry. Boys, aged 12-14, were given tests of rate of tapping. Competition produced higher speed than solitary. Further studies by the same experimenter demonstrated that dynamometer tests showed that strength records increase directly with the size of the group.

Allport (1920b) next set out to compare the mental processes of the individual when alone with his reactions when he was confronted with identical or similar tasks as a member of a "co-working or co-feeling" group. Subjects were instructed to write free associations to words, alone and together, and under certain variable conditions. He found that: (1) the presence of a co-working group was favorable to the speed of the process of free association (This appears to corroborate Freud's assertion that the group milieu permits release of repressions.); (2) there are individual differences in susceptibility; (3) there are both facilitating and impeding factors under group conditions, the former represented by facilitation of movement, and the latter by distraction, over-rivalry, and emotion; and (4) there are more ideas produced in the group, but these are of a lower quality than are those elicited alone.

In his presidential address before the American Psychological Association, Dunlap (1923) set the birth of social psychology with McDougall's publication of his textbook discussed above. He regards its foundations as rooted in three theories: the metabiological theory of Spencer and Schaeffle, the repetition theory of Tarde, and the crowd mind theory of Sighele. The point of the paper appeared to center about a plea for the acceptance of social psychology as an area which studies behavior and differentiates from others only by the situations in which these studies are conducted.

The advent of social psychology struck the early part of the century with a deluge of opinion. It appeared, truly, as though everyone wanted to speak his piece. Baldwin (1906), Angell (1908), Mead (1909), Titchener (1910), Pillsbury (1920), Woodworth (1921), Dewey (1922), and many others saw fit to comment upon the inroads made by psychology into what had been considered the province of sociology. Most of this is now regarded as remote and somewhat immaterial. Nevertheless, it serves to outline the background for what we today consider quite pertinent, and as such, will provide some insights into the problems being considered.

# CHAPTER III

## REVIEW OF THE LITERATURE

Any division of this area into historical and contemporary must be an artificial one. There was, as might be expected, a switch from the theoretical to the more practical, with considerable overlap. The contemporary work is in harmony with the general trend towards applied science, and this will be reflected by the majority of the studies reviewed in this section. Special emphasis will be placed upon those which have some particular relevance to the present experiment.

Allport (1924) carried out a series of studies in the Harvard Psychological Laboratory using groups of graduate students. The fundamental design centered about a task performed under two conditions: alone and with others. Conditions were alternated to equalize the effects of practice, adaptation, and fatigue. In order to arrive at pure derivatives of social facilitation, he made every effort to reduce rivalry to a minimum. The earlier of these studies, dealing with mental processes, was discussed in the previous section. At this time we will examine some of those which dealt with the influence of the group upon judgments of differences in stimuli. The first used discriminations of pleasantness and unpleasantness of odors. There were five series of ten different odors ranging from putrid to perfume. Identical sets were provided for each member of the group and judgments were made at a given signal so that all acted simultaneously, drawing a line on graph paper to indicate their estimate, the longer the line, the more pleasant the odor. Judgments were later made by the same subjects acting alone. A similar experiment was repeated using weights rather than odors. The findings appeared to indicate that a trend towards conformity governs the group situation. Extreme evaluations were drawn towards the conservative midpoint in both studies. Allport translates this to mean that "there is a basic human tendency to temper one's opinions and conduct by deference to the opinions and conduct of others. . . . To think and to judge with others is to submit one's self unconsciously to their standards. We may call this the attitude of social conformity."

Dashiell (1930) instituted a variation by having subjects perform tasks in a room by themselves, yet aware that other persons in nearby rooms were working on the same thing. When the results were compared with those of subjects who were actually alone, they indicated that some degree of social facilitation existed, even though the other members of the group were not actually present in the same room.

Moore (1921) undertook to study the influence of expert opinion, and this inspired scores of ingenious investigations probing from devious angles. Saadi and Farnsworth (1934) evaluated social influences in terms of the affective composition of the group. During the years of World War II the relationship between individual and group assumed a position of vital concern, both with respect to the armed forces and industry. In its wake has come a resurgence of activity attempting to ferret out and distinguish influences to the most refined degree. The futility of attempting to discuss, or even mention in passing, all of these studies is obvious. We shall, instead, consider some of the more representative ones of the last few decades, and finally examine, somewhat more closely, two rather classical experiments which bear directly upon the present one.

Tresselt and Volkmann (1942) hypothesized that certain phenomena, attributed to the workings of suggestion, may also be present when such is of a non-social character. Containers of different weight values were presented to 120 subjects individually who were then required to judge them as heavy, medium, or light. It was discovered that the first few judgments were related to the serial position of the decisions, and despite the fact that the subjects entered the experimental situation with different scales of judgment, these soon converged toward a common determination. On this basis the authors urged social psychologists to seek non-social, as well as social determinants in the formation of opinions.

McCord (1948) studied the influence of the group upon individual judgments of suggested temperature stimulation. The subjects were informed that a positive correlation exists between sensitivity to heat and intelligence. Outlets from an intricate-looking device were attached to each, and the subject was asked to raise his hand when he felt the heat. This was later repeated with groups. Actually no heat was applied at any time. The results, which indicate that the behavior of the group will shift toward greater sensitivity to suggested warmth stimulation, are interpreted to illustrate the influence of conformity-producing agencies in line with the J-curve hypothesis of F. H. Allport.

Stouffer (1949) raised the point that in differentiated societies the individual group memberships are complex and heterogeneous. Behavior in a particular situation is a function of the particular group within which it takes place. He proposed: (1) In any social group there exist norms and a strain for conformity to these; and (2) if these norms are set out without ambiguity the only choice which the individual has is to conform or to take the consequences in group resentment.

Kelman (1950) made the assumption that response to suggestion follows the same laws of learning as does any other activity; that is, it is learned through the process of differential reinforcement. He proposed to produce "differential insecurity" by telling one group of subjects that their judgments of movement in the autokinetic situation were correct, and another group that theirs were incorrect. As hypothesized, individuals in the success group were subsequently less susceptible to a planted subject than were the members of the failure group.

Sherif and Harvey (1952) followed the classical study by Sherif (to be discussed later) on autokinetic movement by using the same device to investigate the effects of variable conditions of situational uncertainty on ego functioning. Situational uncertainty is defined as a "stimulus situation surrounding the individual which lacks stable spatial or other anchorages, consequently, making it impossible or hard for the individual to determine his bearings in relation to objects and individuals in the situation." Thus the experiment was structured as an application of ambiguity to the question of anxiety or vulnerability.

It follows that with ambiguity, as represented by an unstable or uncertain situation, the creation of convergence toward a common norm is followed by a diminution of apprehension. Thus the authors hypothesize that the greater the range of judgments: (1) the greater will be the dispersion of the scatter of individual discriminations, (2) the more divergent will be the differences between the judgments of different individuals, though this trend will be considerably lessened in group situations, and (3) the greater will be the amount of this convergence of judgment for those in the group.

The autokinetic light was utilized under three different degrees of ambiguity. It was found that a definite relationship existed; as the physical and social anchorages decreased in stability, they were accompanied by deterioration of personal bearings, a wider spread of individual judgments, and a greater proneness towards convergence when the judgments were made in a group.

Bovard (1948) stated that perception can be socially modified. Thus, in a group situation there will be a tendency towards the norm of the group, and this will carry over so that the influence of group standards is effective when he is alone. He proposed to determine the influence of a social norm over a 28 day time interval, using as the medium the judgment of an ambiguous stimulus, autokinetic movement.

At the first exposures to the light, the subject was paired with a planted associate who was introduced as a person with high prestige value. The judgments elicited under these circumstances were found to be perseverative over time. He also discovered that changes in scatter and means between individual sessions and sessions with a prestigeful partner on the same day were highly correlated with the degree of carry over of the norm in the individual session 28 days later. A total of 9 subjects was used in this study.

The same investigator (Bovard, 1951) later found that when members of small face to face groups, whose make-up had encouraged verbal interaction, were confronted with a green rectangle and asked to estimate its length anonymously, the dispersion of these judgments exceeded that of those elicited from groups whose composition suppressed interaction. The individual estimate and the group norms were then presented, and anonymous reestimations were solicited. The greater the group interaction, the more significant was the reduction in spread of estimates.

Bovard interpreted this to mean that the alteration of individual perceptions of the figure in the direction of the group norm was a function of the structure of the group. This is particularly so if the group constitution is such that it encourages verbal interaction.

To explore this further, he (Bovard, 1953) used stable versus temporary groups, each of which was asked to estimate the number of dots in a square. Members were then told the group norm, and asked to reestimate. The critical ratio was 4.88 between the groups in favor of greater movement toward the mean of the stable groups. However, repeating this with the green rectangle gave negative results. There were no significant differences. The author suggests that this was attributable to increased sophistication on the part of the subjects who, by this time, had guessed what the experiment was about, having served on the previous one as well.

Mausner (1953) demonstrated that the opinions of subjects taking the Meier Art Judgment Test were affected by the responses of coacting partners, and that this was a function of the partner's prestige value. The partners were co-experimenters who deliberately made wrong choices for all selections. When introduced as fellow students, their influence upon judgments was mediocre; however, when they were presumed to be art experts, the effect upon the naive partner was significant.

Thrasher (1954) attempted to merge in one design two basic aspects of contemporary psychology: motivational factors and stimulus structure. The author contends that these, in previous investigations, had been studied separately. The purpose of his study was to determine the effects of varying motivational factors upon judgments made with diversely structured stimuli. The variable used was the interpersonal relationship between friends and strangers. Thrasher asserted that the intensity of the relationship produced a significant effect upon judgmental variability, and that the weaker the degree of stimulus structure of the experimental situation, the lower the relationship between stimulus and judgmental values, and the greater the variability of judgments. Further, those partners who were friends influenced each other to a significantly greater degree than did those who were strangers.

Blake and Brehm (1954) hypothesized that the presence of an actual person was unnecessary in order to demonstrate the group effect upon individual judgments of autokinetic movement. This was accomplished by using the tape recorder to simulate a social situation.

Walter (1955) set out to review previous findings in apparent movement in the autokinetic phenomenon. He concluded that: (1) subjects tend to maintain the same norm and to reduce the variability of judgments; (2) a reasonable judgment will act as an anchorage, causing a shift in the norm with a reduction of variability; (3) suggestions which are attributed to an acceptable source, but opposite in direction, will increase dispersion and shift the norm; (4) casting doubt upon anchorage points will likewise give rise to an increase in variability of judgments. He then proceeded to test the above by using judgments which had ostensibly been accumulated in educational institutions held in greatest esteem by the subjects. All of these conclusions were supported by the results of his study.

The above experiments have been selected as representative from among the many in this field. As stated at the outset, most are related to the present work. There are, however, two experiments which will be considered at greater length, for these are pertinent as background for the research herein reported.

Sherif (1935) carried out what became, without a doubt, the most widely known study of its type. Furthermore, it has inspired, over the years, a veritable flood of investigation. In a sense, the original orientation of the work has given way to factors more pertinent for modern psychologists. Actually, Sherif sought a common basis for explaining social determination of differential responses and divergent reactions to similar stimuli in a single society, as well as throughout various cultures. For the most part, the latter aspect of this problem has been totally ignored. Our primary concern will be to review Sherif's exploration of the psychological basis of social norms.

The fundamental questions which the inquiry sought to illuminate were: (1) will an individual who is placed in an unstable stimulus situation tend to give a series of erratic judgments, or will he establish his own frame of reference? and (2) what will be the results if a group is confronted with a similar set of conditions? After inquiring into situations which might be structured to set up the requisite environment, Sherif decided to use autokinetic movement and "affectively neutral" prose passages. It is noted that the true nature of the autokinetic phenomenon is still controversial.

The experiment was carried out in various stages. All of the subjects were students at Teachers College, Columbia University, and New York University and were psychologically naive. None wore glasses. In the initial phase 19 subjects were used. They were required to make 100 individual judgments of movement by pressing a key which operated the timing device when the light was seen to begin moving.

Oral estimates were given of the distance it appeared to move. From the accumulated data Sherif concluded that "the subjects subjectively establish a range and a point within that range which is peculiar to the individual."

Part 2 was an attempt to determine the stability of the individual range. Four subjects were used, each making 300 judgments over three periods within a week. The results, according to the author, show that both range and point within range (median) are preserved over time. For the next phase there were 40 subjects divided into 8 groups of two and 8 groups of three subjects. Half of the groups functioned as individuals first and as part of a group next, and the other half reversed the procedure. Instructions were the same as for the first part of the study, although in the group the order of stating judgments was left to the group itself. This was done in order to discover how they would respond to the novelty of the situation.

Sherif found the median and range for individual and group. He then graphed the median values for each subject under individual and group conditions. From these the following are presented as facts:

(1) The median values converge in a "funnel-shaped" relationship from individual to group.

(2) When individuals start in the group the convergence is immediate and persistent.

(3) Divergence of individual medians for individual judgments after the group session is smaller than was found when the order was individual-group, suggesting that "if an individual faces a stimulus

situation and patterns it in his own way first, the group influence is not so dominating as when he faces the situation in the group first." This, being a crucial aspect of the problem, was subjected to another analysis. The author used the critical ratio, difference between medians/PE (diff.), in order to compute the reliabilities. The differences of medians in group-individual order are not significant, whereas those in the reverse order are much larger, and "in many cases statistically reliable."

The latter part of the study deals with the use of prestige suggestions as a factor in differential perception and will not be reviewed.

Indirectly related to our problem was the investigation by Asch (1952) of conditions which motivated independence from or yielding to group pressures for judgments which are contrary to fact. The procedure was as follows: groups of seven to nine college students made successive verbal discriminations, matching a single line with one of three others. These were simple to distinguish, and each made the obvious choice with the first few cards. During the third trial, however, one member, seated toward the end, suddenly made a choice which differed from the rest. From time to time a similar occurrence took place, for the disagreeing member was the critical subject, the rest being planted for the specific purpose of studying his reactions in the face of group insistence on incorrect judgments. The first two discriminations were correct responses, but of the following ten, seven were obviously wrong. At the termination of the twelve trials the naive subject was informed as to the true purpose of the experiment.

It was determined that for 31 critical subjects, two-thirds of the responses were correct as contrasted with those of the planted majority, whereas one-third went along with the group error. For a control group of 25, the comparisons were made privately in writing. Here the errors were 7.4 per cent of the total; the mean error for 12 trials for the experimental group was 2.3 versus 0.5 for the control. Asch concludes from this that although most estimates reflect independence of judgment, there is strong evidence of group influence at work. On the other hand, there were wide individual differences. Some subjects demonstrated complete independence. Others acquiesced fully in the majority opinion. The response to group pressure was found to be related to the degree of error distortion; the more obvious the error, the greater the number of independent judgments, the reverse being likewise true.

On the basis of post-experimental interviews, Asch analyzed the introspective impressions of the subjects in order to account for the above results. At this time it will suffice to note that these are interpreted in terms of field theory.

In further experimentation Asch introduced variations aimed at determining the effects of an increase of the strength of the critical group. Thus when another naive subject was introduced in a position before the critical subject, and his responses were also in opposition to the group, would this provide the other with a greater incentive to judge contrary to the majority. This proved to be the case. Under these conditions the error score dropped from 33 to 13 per cent.

Two further variations were tried, in each case reversing the previous procedure so that the majority of the subjects were now naive. The first design placed a single planted subject in seventh place in a group of 16 with instructions to respond with wrong estimates in certain trials. This did not alter any of the majority responses. When two almost equal groups were pitted against each other (11 naive, 9 planted) the naive judgments were maintained consistently. Asch noted that whereas the single planted subject had been assailed with evidences of ridicule, in the more evenly distributed group the naive subjects were respectful of similar responses by the others.

The foregoing studies have, for the most part, been presented without comment or criticism. They serve to establish the background or the orientation for this experiment. Many of them will be referred to again when the findings of this investigation are discussed.

## CHAPTER IV

## THE EXPERIMENT

### Purpose of the Study

The works reviewed in the previous sections indicate that studies in the area of group influence upon individual judgment and perception have usually been developed around single sensory modalities, particularly vision. Let us, for example, briefly examine the Sherif experiment which has since served as a model for numerous other investigations. It is important to note that Sherif used the autokinetic phenomenon as a tool for measuring social dynamisms, and that this device has become the single most popular medium used in studies of this type. Sherif (1935; Sherif and Sherif, 1956) has traced the history of the autokinetic effect and has reviewed the various theories concerning its nature. Whether it is of central, peripheral, or retinal origin is still unknown. Despite the fact that Sherif stated that, for his purposes, the nature of the autokinetic effect is immaterial, he still carefully selected subjects from among those who did not wear glasses. This makes good sense with most experiments using such stimuli, but the difficulty of evaluating individual differences in sensory modalities complicates studies dealing with suggestion and frames of reference. It is completely logical to assume that people with some degree of visual defect would tend to be more swayed by the judgments of others when confronted with the necessity for making visual discriminations. It is doubtful that any such study has accomplished, or even attempted, an adequate equating of the subjects.

It is evident that little heed has been paid to group differences in interaction effects. Where this has been investigated the crucial variable was the experimental situation rather than the inherent differences between groups. Social interaction has been regarded as a phenomenon, equivalent intraculturally, though encompassing individual aberrations. The dearth of intergroup evaluation is even more striking in the face of the increasing number of studies probing group variation in intellectual, emotional, and personality factors. The vast majority of experimenters have concluded that social influences are universal, choosing to manipulate the conditions under which these are activated, theorizing upon the structure and dynamics of the performance, and, for the most part, ignoring the fact that other environmental and physical forces are pertinent operating factors.

Finally, we must consider the experimental design and scope of the studies, as well as the methodology, handling of data, and soundness of conclusions. For many of the works reviewed the conclusions were based upon an insignificant number of subjects; others evaluated measurable data in subjective terms only; still others established "facts" on the basis of evidence that may or may not be statistically significant. Indeed, Sherif (1935) establishes these "facts" for one of the "crucial tests for our problem" on data which are "in many cases statistically reliable" and based upon 40 subjects.

Too often we find test trials being evaluated as though they were subjects.

The intent is neither to deprecate nor to disparage the efforts of these investigators but merely to reiterate the task that lies before the social scientist who purports to assay behavior in an objective manner. As stated at the onset, such was one of the aims of this paper. Another was to suggest the use of some medium other than that of a single sensory modality. The judgment of a time interval was used in order to scrutinize interaction effects, and it appeared that this device would eliminate the objection raised above. It is unlikely that visual, auditory, olfactory, or other sensory excellence or defect will influence whatever processes are operative in making time judgments. Little is known about the forces which activate and govern discrimination of temporal duration. Woodrow (1951), who has done considerable research on this topic, asserts, "Time is not a thing that, like an apple, may be perceived. Stimuli and patterns of stimuli occupy physical time; and we react to such stimuli by perceptions, judgments, comparisons, estimates, etc. Whether some mental variable such as duration or protensity is an immediate property of our perception of temporal stimuli, or of mental processes in general, is a matter of some disagreement. If there is no such immediately given property, it follows that time is a concept, somewhat like the value of pieces of money, that attaches to perceptions only through a judgmental process. The ease and apparent immediacy of the temporal judgment in certain cases might be explained as the result of practice, much of it occurring in the first few years of life, in the interpretation in terms of physical time of numerous alleged temporal cues." In the interests of simplicity a time interval without concurrent activity was used. This will be further discussed in the section dealing with procedures.

In light of the uniformity of approach to the subject, it seemed highly desirable to initiate a somewhat different mode of attack. We may safely assume that people react to social stimuli, that judgments (or perceptions) are influenced by those of others around them, and that variable stimuli or circumstances operate differently, or at least elicit diverse responses. In this study we concerned ourselves with group trends under approximately constant conditions. Specifically, the task was to analyze differences (if such existed) for degree of susceptibility to group influences among members of five different groups: children, college students, the aged, the deaf, and the blind. It is obvious that visual or auditory devices would be ineffectual for our purpose, whereas time judgments proved to be highly applicable.

It was hypothesized that different age groups, as well as the deaf and the blind, will demonstrate varying amounts of group influence in making time judgments.

## Apparatus

The apparatus (Figure 1) consisted of five identical wooden devices for starting and stopping stop watches. The watches were set into a framework attached to a heavy base. Extending from a scaffolding was a light lever which, when depressed by the subject, activated

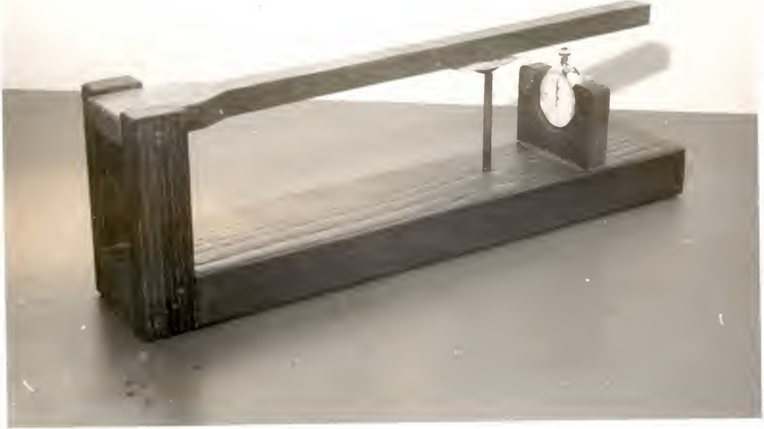

Fig. 1--Mechanism for starting stop watch the stop watch. Underneath this lever was affixed a metal noisemaker or "clicker" commonly used by children at Halloween. When the lever was pushed, the "clicker" made contact with a rod extending upward from the base. This served a dual purpose: its spring-like action raised the lever from the starting button, and it clicked audibly when the watch was started or stopped by the subject.

## Subjects

Aside from controls and preliminary subjects, five groups were used. During the first stages 20 subjects of various ages from 9 to 75 were utilized to structure procedure, to clarify instructions, to determine the experimental time interval, and to eliminate as far as possible, any complicating factors.

The first experimental group consisted of 125 boys and girls attending Camp Sussex, a camp for underprivileged children located in the mountains of northern New Jersey. All were residents of New York City and comprised the total camp population between the ages of 9 and 12.

The college group was composed of 105 male and female students, aged 18 to 32. Most of them were members of introductory classes in Industrial Psychology and the Psychology of Advertising, majoring in such fields as journalism, business administration, and engineering. They were unfamiliar with the field of social psychology.

The aged group were residents at Moosehaven, a retirement community owned and operated by the Loyal Order of Moose, and located at Orange Park, Florida. The ages ranged from 65 to 88.

All of the members of the deaf and blind groups were students at the Florida School for the Deaf and the Blind at Saint Augustine, Florida, and represented all within the desired age or class ranges available at the time. The Asiatic influenza epidemic hospitalized a great proportion of the school population, and many students could not be used during the three weeks of testing. In the deaf group 115 children served as subjects. The ages ranged from 10 to 19, but no child below the third grade was used. The blind subjects, numbering 60, were aged 9 to 20 and consisted only of students considered legally blind. Those with other visual defects were not included.

Sixty control subjects were divided into two groups, one ranging in age from 11 to 69, the other consisting of Girl Scouts 11 to 13 years old.

An attempt was made to get a middle-aged group. With considerable effort, 30 cases were accumulated. The difficulties encountered in further attempts to gather more subjects were so great that the effort was abandoned. After careful consideration, it was decided that an N of 30 cases was insufficient, hence to discard and not report the data.

To recapitulate, the number of subjects in the various groups was as follows:

| | |
|---|---|
| Preliminary group . . . . . . . . . | 20 |
| Nine to 12 group . . . . . . . . . | 125 |
| College group . . . . . . . . . . | 105 |
| Aged group . . . . . . . . . . . . | 65 |
| Deaf group . . . . . . . . . . . . | 115 |
| Blind group . . . . . . . . . . . . | 60 |
| Control groups . . . . . . . . . . | 60 |
| Total subjects used | 550 |
| Subjects not included | 30 |
| Total subjects | 580 |

## Procedure and Methodology

Except for variations which will be specified, all of the groups were handled alike. All subjects, aside from one of the groups, reported to a prearranged place in groups of five. The only information given to them was that they were to take part in a research experiment, that it would not be harmful, and that it would not be a test of intellectual capacity. The examiner requested that one of the subjects accompany him to another room while the other four were asked to wait. There on a table was the piece of apparatus previously described and shown in Figure 1. The subject was seated at the table with the experimenter opposite him. The watch dial faced the latter and was invisible to the subject. If wearing a wrist watch, he was asked to remove it for the duration of the experiment. The experimenter then said, "This gadget in front of you is something to start and stop a stop watch. When you push the lever like this (demonstrating), it starts the watch. Then when you push it the second time like this, it stops the watch. When I press this little button here it sets the watch back to zero. Understand? Now what I would like you to do is to start the watch, and when you think that 30 seconds, that is half a minute, have passed, push the lever again to stop the watch. All right? Go ahead." After the first trial the time was recorded (without the subject's being informed of his score) and the experimenter said, "Please continue to do the same thing 9 more times. I'll let you know when you are through so you won't have to bother keeping track of how many you have done." After the ten trials were completed, the subject was asked his name, age, and highest school grade attained. He was requested not to discuss the experiment with any of the others, was escorted back to the waiting room and told that he would be asked to return to the experimental room shortly. When the fifth subject was finished with his ten trials, the others were brought back to the testing room and all five seated side by side in the order of their original appearance. Each was given a piece of apparatus similar to the one previously used. The experimenter sat facing the group with all of the watch dials visible to him alone. He stated, "I would like you to do ten more trials just as we did before, but in order to save some time we will all run them together. Start your watches when I say ready, set, go, and each of you stop your watch whenever you think that 30 seconds have passed. After you have stopped your watch, wait until everyone has stopped theirs, and I will set all the watches back to zero. We will then start the second round together the same as the first one. Remember: stop your watch whenever you think that 30 seconds are up. Ready, set, go!"

After ten trials in the group the subjects were thanked for their cooperation and dismissed. Those who wanted to know how close they came to 30 seconds were given that information privately. All had been previously impressed with the fact that there was no reason to believe that the ability to judge 30 seconds is in any way a measure of intelligence. No information as to the nature of the research was given to any of the subjects until all of the data had been collected from all groups. Some of the subjects wondered why the "clickers" were used, and they were informed that these served the purpose of lifting the lever off the watch stem, which, though by no means the whole story, was certainly the case.

As stated above, there were some variations in the procedure just described. Sixty members of the 9 to 12 camp group were used to determine whether there is a carry-over into individual judgments from the group situation which came first. A supplementary hypothesis to be tested under reversed design states that the individual judgments made after group norms have been established will diverge somewhat, but not as far as was the spread of individual judgments which came first. In order to throw light upon this, the groups of five subjects were first tested in the group, and then individually. The instructions were fundamentally the same, except that the explanatory remarks were made to the group together, rather than to each member separately. Thus, for the 9 to 12 year old subjects there were two designs, the first structured to determine how judgments change as a result of the modification in social environment from the alone to the group situation, and the other to measure the carry-over effect in a reverse process.

Before attempting to test the handicapped groups, the experimenter consulted with John M. Wallace, President of the Florida School for the Deaf and the Blind, Lee A. Iverson, Principal, Department for the Blind, and Richard K. Lane, Principal, Department for the Deaf. It was agreed that the blind could be handled in the same manner as were the normals, for they would be fully aware of the different situations, that is, alone and together. Furthermore, having been tested alone first, they would understand the meaning of the click. They would recognize that a judgment of 30 seconds had been made by someone and thus be exposed to group interaction.

With the deaf, however, there was the added difficulty of making them aware of what judgments the others in the group were making. Since they could obviously not hear the clicks, some other approach had to be found. Two suggestions were considered: electrifying the mechanisms so that upon contact a light would go on, and the other, suggested by Mr. Lane, of seating the group around a table so that each could watch the actions of the rest. The watches could be hooded so that they could not be seen by the subjects. On the basis of Mr. Lane's experience with the deaf, the latter method was adopted, for he felt that the light panel would only serve to distract the subjects from the task at hand. Another difficulty lay in making the instructions clear. In order to duplicate the experimental procedure as far as possible no interpreter was used, and the experimenter learned to make the necessary signs to convey the explanation and instructions. In addition to this, instructions were printed on the blackboard, and if the subject had difficulty in understanding the signs, he could read them himself. The group instructions were on another blackboard, covered by a large card so that the individual subjects would not see them. This was removed when all five were ready to proceed together. There was one change in the instructions for the deaf. They were told to lay the hand flat on the table; raise the hand to the lever to start the watch; lower it to the table; raise it again only when they wanted to stop the watch, and so forth. This was to make sure that all of the others would be aware of when each made a judgment. It was obvious that this was the case, for each watched the others closely to note when they pushed the lever. The watch dials were covered by cards thumb-tacked to the frame on one side. After each round of judgments was completed, the experimenter lifted the card, recorded the time, reset the watch, and replaced the card without any of the subjects being aware of his own time or that of any of the others. Then the next round was begun.

The control groups were used to ascertain whether any differences may have been attributable to time order (ten trials followed by ten trials), fatigue, or practice, rather than to interaction effects. Thirty subjects were tested in two individual sessions apiece, and the other thirty were tested in groups of five in group-group order. Thus, if there were no significant differences between the first and last ten trials for these control groups, it is possible to assume that any differences found in the experimental groups were not due to the fact that one test follows the other in time.

## CHAPTER V

## RESULTS AND DISCUSSION

Before becoming involved with the analysis of the data, it might be desirable to mention briefly how they were recorded. A glance at Table I, which represents an actual group with everything intact except for the names, will give a clearer picture of the recording process. The information after the names gives sex, age, and, in this case, college classification. Single scores were noted as such but never used beyond that. The subject's derived score was the total of the ten trials (each subject had two such scores: one individual, the other in the group). This was the score used in all computations. Note that the mean scores were actually the means for five subjects as individuals and as members of the group.

Standard deviations were derived for each set of scores (two for each group of five subjects), and the Charlier check was applied to the sum of squares of the deviations from the group mean. This served to check the accuracy of each step to that point. Next we determined the means for the total group under both experimental conditions, and subtracted from it the means of each of the groups of five. These deviations were squared and added, and from them was derived the between sum of squares (after multiplying by five). The within sum of squares had been previously computed by adding the sums

## TABLE I

## SAMPLE OF DATA SHEET

| Subjects | A<br>M, 20, 3 | B<br>F, 19, 3 | C<br>M, 21, 2 | D<br>M, 20, 3 | E<br>M, 22, 3 | Mean |
|---|---|---|---|---|---|---|
| Scores as individuals: | 28 | 29 | 17 | 45 | 11 | |
| | 27 | 30 | 19 | 43 | 9 | |
| | 29 | 30 | 20 | 47 | 11 | |
| | 30 | 34 | 18 | 49 | 19 | |
| | 31 | 32 | 19 | 47 | 21 | |
| | 34 | 34 | 21 | 45 | 14 | |
| | 34 | 34 | 21 | 46 | 12 | |
| | 36 | 32 | 20 | 47 | 12 | |
| | 35 | 34 | 20 | 54 | 13 | |
| | 37 | 30 | 20 | 46 | 14 | |
| Totals | 321 | 319 | 195 | 469 | 136 | 288.0 |
| Scores in groups of five: | 29 | 27 | 20 | 34 | 18 | |
| | 30 | 29 | 30 | 35 | 30 | |
| | 30 | 30 | 29 | 36 | 24 | |
| | 32 | 31 | 31 | 37 | 31 | |
| | 32 | 31 | 31 | 38 | 31 | |
| | 32 | 31 | 31 | 37 | 35 | |
| | 32 | 28 | 28 | 35 | 34 | |
| | 32 | 28 | 29 | 36 | 32 | |
| | 33 | 30 | 30 | 35 | 33 | |
| | 32 | 33 | 33 | 35 | 35 | |
| Totals | 314 | 298 | 292 | 358 | 303 | 313.0 |

of squares of the deviations from the mean of each group of five.

The total sum of squares was computed by squaring each subject's score and adding the total, then subtracting from it the square of the sum of the scores divided by N. In some cases the total sum of squares differs by .01 from the value obtained by adding the between group and within group sums of squares. This is a rounding error. As described above, all of these values were separately computed, thus providing a complete check on the three values.

An examination of the top half of Table II through Table VI reveals that in the individual sessions the variance estimate based upon the between groups and the one based upon within groups generally showed very little difference. At the Florida School for the Deaf and the Blind the students were, for the most part, not chosen at random, but were tested according to classes, the most advanced being tested first. This might be expected to produce larger variance estimates on the basis of between groups comparisons than on the basis of within groups comparisons. Such was the case although only one of these differences was statistically significant.

If a convergence toward the mean in time judgments is a valid measure, there is little doubt concerning the pressures which are exerted upon the individual by the group. Thus, you might expect that this would lead to more homogeneous responses within groups than between groups. Again, such was the case. Every one of these differences was significant beyond the .001 level of confidence.

A rough idea of the size of these differences in the group

## TABLE II

## ANALYSIS OF VARIANCE TABLE FOR CHILDREN AGED 9 TO 12 WHEN TESTED IN THE USUAL MANNER, FIRST AS INDIVIDUALS AND THEN IN GROUPS (CAMP SUSSEX)*

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| As Individuals: | | | | | | |
| Between Groups | 749,383.82 | 12 | 62,448.65 | 249.90 | 1.00 | Not Significant |
| Within Groups | 3,238,048.40 | 52 | 62,270.16 | 249.54 | | |
| Total | 3,987,432.22 | 64 | 62,303.63 | 249.61 | | |
| In Groups of Five: | | | | | | |
| Between Groups | 220,412.06 | 12 | 18,367.67 | 135.53 | 8.02 | .001 |
| Within Groups | 119,166.00 | 52 | 2,291.65 | 47.87 | | |
| Total | 339,578.07 | 64 | 5,305.91 | 72.84 | | |

*Not to be confused with Table VII.

## TABLE III

## ANALYSIS OF VARIANCE TABLE FOR COLLEGE STUDENTS (UNIVERSITY OF FLORIDA)

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| As Individuals: | | | | | | |
| Between Groups | 115,373.79 | 20 | 5,768.69 | 75.95 | .97 | Not significant |
| Within Groups | 497,217.20 | 84 | 5,919.25 | 76.94 | | |
| Total | 612,590.99 | 104 | 5,890.30 | 76.75 | | |
| In Groups of Five: | | | | | | |
| Between Groups | 64,521.96 | 20 | 3,226.10 | 56.80 | 3.45 | .001 |
| Within Groups | 78,445.60 | 84 | 933.88 | 30.56 | | |
| Total | 142,967.57 | 104 | 1,374.69 | 37.08 | | |

## TABLE IV

## ANALYSIS OF VARIANCE TABLE FOR AGED
(MOOSEHAVEN)

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| As Individuals: | | | | | | |
| Between Groups | 127,585.35 | 12 | 10,632.11 | 103.11 | 1.04 | Not significant |
| Within Groups | 530,306.80 | 52 | 10,198.21 | 100.99 | | |
| Total | 657,892.16 | 64 | 10,279.57 | 101.39 | | |
| In Groups of Five: | | | | | | |
| Between Groups | 229,855.26 | 12 | 19,154.61 | 138.40 | 25.25 | .001 |
| Within Groups | 39,443.60 | 52 | 758.53 | 27.54 | | |
| Total | 269,298.87 | 64 | 4,207.79 | 64.87 | | |

TABLE V

ANALYSIS OF VARIANCE TABLE FOR BLIND
(FLORIDA SCHOOL FOR THE DEAF
AND THE BLIND)

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| As Individuals: | | | | | | |
| Between Groups | 551,013.38 | 11 | 50,092.13 | 223.81 | 1.90 | Not significant |
| Within Groups | 1,266,165.20 | 48 | 26,378.44 | 162.41 | | |
| Total | 1,817,178.59 | 59 | 30,799.64 | 175.50 | | |
| In Groups of Five: | | | | | | |
| Between Groups | 489,332.73 | 11 | 44,484.79 | 210.91 | 15.65 | .001 |
| Within Groups | 136,426.00 | 48 | 2,842.21 | 53.31 | | |
| Total | 625,758.74 | 59 | 10,606.08 | 102.99 | | |

## TABLE VI

## ANALYSIS OF VARIANCE TABLE FOR DEAF (FLORIDA SCHOOL FOR THE DEAF AND THE BLIND)

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| As Individuals: | | | | | | |
| Between Groups | 735,048.70 | 22 | 33,411.30 | 182.79 | 2.21 | .01 |
| Within Groups | 1,390,495.60 | 92 | 15,114.08 | 122.94 | | |
| Total | 2,125,544.30 | 114 | 18,645.13 | 136.55 | | |
| In Groups of Five: | | | | | | |
| Between Groups | 1,134,120.52 | 22 | 51,550.93 | 227.05 | 20.99 | .001 |
| Within Groups | 225,951.60 | 92 | 2,456.00 | 49.56 | | |
| Total | 1,360,072.13 | 114 | 11,930.46 | 109.23 | | |

## TABLE VII

### ANALYSIS OF VARIANCE TABLE FOR CHILDREN AGED 9 TO 12 WHEN TESTED FIRST IN GROUPS AND THEN AS INDIVIDUALS (CAMP SUSSEX)*

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| In Groups of Five (First Testing): | | | | | | |
| Between Groups | 1,249,273.93 | 11 | 113,570.36 | 337.00 | 20.64 | .001 |
| Within Groups | 264,064.80 | 48 | 5,501.35 | 74.17 | | |
| Total | 1,513,338.74 | 59 | 25,649.81 | 160.16 | | |
| As Individuals (Subsequent Testing): | | | | | | |
| Between Groups | 459,170.98 | 11 | 41,742.82 | 204.31 | 4.32 | .001 |
| Within Groups | 463,517.20 | 48 | 9,656.61 | 98.27 | | |
| Total | 922,688.19 | 59 | 15,638.78 | 125.06 | | |

*Not to be confused with Table II.

## TABLE VIII

## ANALYSIS OF VARIANCE TABLE FOR CONTROL SUBJECTS TESTED IN GROUP - GROUP ORDER (GIRL SCOUTS)

| Source of Variance | Sum of Squares | df | Variance Estimate | Standard Deviation | F | Significance Level |
|---|---|---|---|---|---|---|
| In First Groups of Five: | | | | | | |
| Between Groups | 313,796.57 | 5 | 62,759.31 | 250.52 | 32.96 | .001 |
| Within Groups | 45,698.80 | 24 | 1,904.12 | 43.64 | | |
| Total | 359,495.37 | 29 | 12,396.39 | 111.34 | | |
| When Retested in Same Groups of Five: | | | | | | |
| Between Groups | 243,947.07 | 5 | 48,789.41 | 220.88 | 21.79 | .001 |
| Within Groups | 53,745.60 | 24 | 2,239.40 | 47.32 | | |
| Total | 297.692.67 | 29 | 10,265.26 | 101.32 | | |

situation may be obtained by noting that the between group variance estimate is from 3.5 to 25.3 times as large as the within group variance estimate. The Moosehaven (aged) subjects demonstrated the greatest amount of group influence while the college students were least affected, with the rest in between: deaf, blind, and 9 to 12 in descending order. This may signify that there does exist a hierarchy in the degree of group influence for groups of different composition. There is certainly some evidence refuting the common stereotype of the aged as a person who is stubbornly resistant to the demands of others. We must, of course, recognize that our sample is derived from an institutional setting, although it is of a cooperative nature. It is not possible to generalize too broadly. The degree of susceptibility to group pressure does, however, present clues concerning the extent to which the aged depend upon others for acceptance and support.

It is not surprising to note that the college students were least swayed by their peers. Perhaps we may regard this as derivative of a successful academic structure which develops, or at least encourages, independent thinking and action. This merely points out another limitation of the present study, for the result may certainly be attributable to age, education, intelligence, or to some other variable. Nevertheless, there appears to be definite evidence of the existence of group differences in the extent of sensitivity to the influence of the group.

As stated earlier, in most of the groups, the individual sessions preceded the group sessions. In this way, it was possible to obtain a mean score for each subject in the alone situation, and then to measure how this would change in the face of judgments made in a group. Sixty of the 9 to 12 camp population were subjected to reversed conditions. They were tested in groups of five and then tested individually, in order to determine how much carry-over there was from the group to the individual situation. Sherif (1935) was extremely interested in this aspect of behavior in his study with autokinetic movement. He concluded that "the closeness of the medians of individuals in the group, which suggests the establishment of a common norm for the group in the cases of groups starting with the group situation, *is a very important fact that we wish to stress. Especially important is the fact that the divergence of the median values* established by the subjects in the individual session *after* the group sessions is small. *Compared with this, when the subject starts with an individual session and then is brought into a group the convergence of the medians* (see the funnel shaped relationship) *is not so close*--suggesting that if an individual faces a stimulus situation and patterns it in *his own way* first, the group influence is not so dominating as when he faces the situation in the group first."

This was subjected to what Sherif called "a special analysis" which was covered in a previous section of this dissertation. The above conclusions were based upon N's of 8, 8, 12, and 12, each handled as a distinct statistical unit, and the differences attributed to these groups were based upon data which were "in many cases statistically reliable."

At a later date Sherif (Sherif and Sherif, 1956) again reviewed the same study. At that time he stated, "When the person who develops a range and a norm within that range independently is put into a situation together with others who also enter the situation with their own ranges and norms established in their own individual sessions, the ranges and norms of the various individuals tend to converge. But this convergence is not so close as that which occurs when the subjects first work together and have less opportunity to set up stable individual norms."

An examination of Table II and Table VII will reveal that for the 125 subjects tested, those 65 which were taken in individual-group order (Table II) demonstrated no difference in the individual situation in the variance estimate based on between groups and within groups. In the group situation the F was significant at well beyond the .001 level of confidence. Hence the change in the relationship between the variances was highly significant.

For those 60 who made their judgments in group-individual order (Table VII), the F's for both conditions were significant beyond the .001 level, but whereas the F for the group situation was 20.64, it was 4.32 for the individual sessions. Furthermore, the standard deviation corresponding to the total variance estimate in Table VII changes from 160.16 to 125.06, whereas in Table II, it decreases from 249.61 to 72.84, which indicates that although there is some effect upon the individual judgments which follow the group session (Table VII), there is far more convergence in the group situation which comes after the individual trials (Table II).

The control groups were employed primarily to determine whether differences found might not be attributable to the fact that the second set of trials follows the first in time, rather than to interaction effects. In order to adhere rigidly to the experimental design, all groups were scheduled to meet in groups of five. At times, one or more did not show up, and naturally, the conditions of the design could not be fulfilled. These subjects (composing the groups of less than five) formed the basis for the first control group of 30 who were tested individually in both trial sets. That is, they were utilized to study whether subjects tested alone for one series, and then retested alone would have any tendency to converge. The formula

$$\sigma = \sqrt{\frac{\Sigma x^2}{N - 1} - \frac{(\Sigma x)^2}{N(N - 1)}}$$

by Walker (1943) was used for both sets of scores, and the standard deviations were 100.55 for trial one and 114.56 for trial two. As there was no convergence (actually the reverse was true), we may assume that under the above conditions the differences found were not due to the fact that one test preceded the other in time.

The remaining 30 controls (Girl Scouts, 11 to 13) were tested in groups of five for both sets of trials. An examination of the results in Table VIII reveals that the standard deviation obtained from the total variance estimate changes from 111.34 for the first set of ten trials to 101.32 for the second. In order to determine whether this difference was statistically significant, r was computed and found to be .966. Substitution in the formula for the standard error of the difference between standard deviations showed that the difference failed to reach significance, even at the .05 level of confidence.

It is possible to assume, therefore, that the consistent change which took place in judgments from the individual to the group sessions was not merely a factor of one test following the other in time, and the indications are that it was the result of group interaction.

Aside from the analysis of data reported above, the scores of the 9 to 12 group were scrutinized in order to determine the practicability of further examination for all groups. Ratio scores were derived for each individual by dividing his total score in the individual session by his total score in the group session, for those tested in individual-group order. The reverse process was followed for those tested in the group-individual order. This provided an individual estimate of the degree to which the scores were influenced from one condition to the other. These ratio scores were graphed in order to determine whether differences existed for the subjects in relation to sex, age (9, 10, 11, and 12), school grade, and school grade achievement (obtained by subtracting grade from age). None of these differences were statistically significant.

In order to determine whether there was a tendency for high initial estimates to be associated with increases or decreases in subsequent scores, correlations were computed between the first time estimate and the quotient obtained by dividing the average of the last nine estimates by the first one. Similarly, the first time estimate was correlated with the average of the last five divided by the first one. These explored the value of dealing with part scores derived from the total, and this was abandoned as not leading to useful results.

In addition, correlation matrices were plotted for all five groups in order to determine whether a relationship existed between the standard deviations for each sub-group's individual and group scores. Only the college students showed a slight positive correlation, the remainder approaching zero.

Turning again to our data, analysis reveals that while it seems reasonable to recognize the existence of forces which interact within a group to influence the judgments of the individual members, it is as hazardous to assume that all groups will respond in a like fashion as it would be to make the same supposition about the individuals within a group. It is possible to probe into these matters more subjectively, though such was not the direction of this paper. Nevertheless, one dealing with these forces experimentally cannot avoid being struck by the dynamics of the situation. For example, there was no overt behavior which particularly differentiated one age level from any other, or, for that matter, the deaf and blind from the normals. There were occasions in each when the members of the group attempted to influence individuals whose judgments were out of line with the rest; there were those who submitted readily to these pressures; there were others who resisted throughout. At every level there soon developed pairings or threesomes which acted almost simultaneously and were obviously aware of the relationship. A form of leadership developed upon occasion, such that one person always initiated action and the others followed, occasionally in some consistent pattern. At other times it appeared that leadership would be challenged, successfully or otherwise. Among the deaf there was an atmosphere of hyperactivity enhanced by the fact that all communication was by signs. The blind seemed more docile and withdrawn, yet group influences and demands were expressed as insistently as they were in the other groups. None of the above will come as a revelation to other experimenters in this field. It seems noteworthy that despite the variation in degree of influence, as manifest by judgmental change, patterns of overt behavior were not exclusive, though no inference is intended that valid differences do not exist. No statistical evidence on the matter will be offered in this paper.

In the light of the results reported in this study, it might be of some value to review, briefly, some of the theories and findings of a few others heretofore discussed. No attempt will be made to speculate upon the role of possible conscious, unconscious, or motivational forces operating as factors in interaction.

Our findings certainly are in agreement with the conclusion of Allport (1920b) that there are individual differences in susceptibility. They also corroborate the results obtained by his experiment (Allport, 1924) on weight and odor judgments which, in the group, were drawn toward the conservative midpoint. His interpretation of this phenomenon has been previously reported on page 11.

According to the Tresselt and Volkmann (1942) hypothesis, judgments influenced by suggestion may be of non-social character. The present study throws no direct light upon the validity of this statement. It is possible to assert, however, that individual judgments did not tend to converge in this case as they did in their experiment on weight discriminations.

Bovard (1948) had measured the amount of carry-over from a social situation with a prestigeful partner to an individual session at a later time. Though prestige was an unknown factor, the reversal of design with the 9 to 12 groups indicates that such carry-over is present and influential. This has already been discussed at some length in connection with the Sherif (1935) study. Another assertion by the same author (Bovard, 1951) is that reduction in spread of estimates is a function of the group interaction. This was found to be the case as far as homogeneity was concerned, but there is no actual evidence that the degree of group interaction directly influenced the amount of change. The Moosehaven subjects showed the greatest while the college students demonstrated the least influence. The former, though living an institutional existence, have separate residence halls where they live, eat, and carry out most of their activities. In almost all cases groups were accumulated from different places with the final goal of getting five together, and they generally consisted of subjects living in different homes. The college groups, on the other hand, were primarily members of the same class, and some of the groups were arranged by the subjects themselves from among those living in the same residence halls. The question is assuredly still an open one, and the Bovard conclusion cannot be regarded as wholly justified.

In general the findings of this study are in agreement with former studies which set out to evaluate the degree to which an individual is affected by others in his group. There is ample evidence that his judgments are strongly influenced by the judgments of those around him. It appears that the group trend is towards conservatism, for extreme judgments of time were drawn closer to a mid-value.

Turning now to differential total group effects, these appear to be present for the groups tested. The camp children, the college students, the aged, the deaf, and the blind (as groups) demonstrated varying degrees of susceptibility to the group. It is of interest to note that the two handicapped groups did not fall far out on the continuum, as might possibly have been anticipated. On the basis of this, it is logical to rationalize that these results reflect the particular needs inherent in the deaf or blind subject who must rely upon himself for cues not necessary for the normal person. Is this a demonstration of greater independence and individuality than might be otherwise found? It is an interesting thought, but one which cannot be answered on the basis of data presented in this study.

This raises a final point concerning the limitations of the present experiment. Fundamentally, each group was formed as a unit in terms of a single variable. For three of the groups this variable was age; for the other two it was the presence of either deafness or blindness. There is no assurance that these were the critical variables involved, and any generalizations made from the data must be confined within the bounds of scientific discretion.

# CHAPTER VI

## CONCLUSIONS

1. An analysis of the data indicates that the effects of group interaction upon individual time judgments which came before it are differential in character for different age groups as well as for the deaf and the blind.

2. In this study, the aged group demonstrated the greatest effects, followed by the deaf, the blind, the children aged 9 to 12, with the college students being the least influenced.

3. With the 9 to 12 group it was found that the individual judgments made after group norms had been established diverged from those made in the group but did not spread as far as the individual judgments which came first.

4. When the data from the 9 to 12 group were subjected to additional exploratory analysis, it was discovered that there were no statistically significant differences in the ratio scores for sex, age (within this group), school grade, or relative school grade achievement.

5. In all of the experimental groups, extreme judgments (either at the low or high end), made in the individual sessions, tended to converge when the subjects met in groups of five.

6. Patterns of overt behavior were not particularly exclusive to any group, though there is no statistical evidence that differences

do not exist.

7. There are individual, as well as group differences in susceptibility to the demands of the group situation. There were those in the deaf, blind, and at each age level who resisted efforts directed at making them conform.

8. There is no evidence that the degree of group interaction is the crucial factor in how strongly the members are influenced by each other.

9. The use of time judgments rather than some single sensory modality (if such exists) served admirably as a device for measuring the extent to which individual judgments were influenced by the group.

10. It is not possible to assert that age or handicap was the conclusive variable in this study, but merely to offer the results as evidence relating the effects of interaction with these particular groups. This is proposed as a first step which should lead to hypothesis rather than to generalization.

11. Control groups indicate that the results were not attributable to the fact that one test followed the other in time.

# CHAPTER VII

## SUMMARY

1. A total of 580 subjects were given a time judgment test which consisted of 20 estimations of the duration of 30 seconds.

2. Of these, five groups: the aged (above 65), college students, children (9 to 12), blind, and deaf were tested individually first, and later in groups of five in order to determine the effects of the group interaction upon the individual judgments which came first. The results were subjected to analysis of variance, and group differences in susceptibility were found to exist. The order of influence from most to least was: aged, deaf, blind, children, college.

3. Reversing the order for 60 of the 9 to 12 group so that the group test was followed by individual trials resulted in a dispersion of scores which was not, however, as widespread as those of the individual tests which came first.

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# BIOGRAPHICAL ITEMS

Morton A. Bertin was born on June 28, 1913 at Plainfield, New Jersey. He attended Union Junior College, Rutgers University (Newark School), and was graduated from the University of Florida in January of 1955 being awarded the Bachelor of Arts degree with honors. One year later, in January of 1956, he received the Master of Arts degree at the same institution.

The writer is a member of the Phi Kappa Phi and Alpha Kappa Delta Honor Societies. Professional memberships include the American Psychological Association, Southeastern Psychological Association (member of the Program Committee), Florida Psychological Association, Psychometric Society, and American Association for the Advancement of Science.

In 1955 he was appointed a United States Public Health Service Research Fellow of the National Institute of Mental Health and is at present serving his third year of that award.

This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of the committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

February 1, 1958

C. F. Byers

Dean, College of Arts and Sciences

Dean, Graduate School

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